

MONTHLY WEATHER REVIEW,

MAY, 1875.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

The Weather Review for the current month is based upon the regular tri-daily telegraphic Weather Maps, and upon regular Monthly Reports from 92 Signal Service stations, 12 Canadian stations, 52 Army Surgeons, 1 Naval Hospital, 301 Volunteer Observers, and upon miscellaneous sources of information.

The principal features of the month have been (1) the low temperature in the eastern portions of the country, attending an extensive area of high barometer. The temperature has been generally below the average for the month, and especially so in the St. Lawrence valley. It has been above the average from the Gulf States to the Lower Lake region. (2) The tornadoes in Iowa, Illinois, Indiana and Ohio. (3) The excess of rain on the south Atlantic coast and from Missouri to Indiana, the deficiency in Tennessee, the Gulf and Middle Atlantic States. (4) The absence of auroras and thunder-storms. (5) The continuance of extensive ice-fields and large ice-bergs in the Gulf of St. Lawrence and to the south and east of Newfoundland.

BAROMETRIC PRESSURE.

The general distribution of barometric pressure during the month is easily seen from the isobars on Map No. II. The highest pressure, as usual, is on the south Atlantic coast. The lowest pressure is in the Northwest, where the barometer is apparently lower by 0.05 than in May, 1874. On the Pacific coast the pressures have been lower in California and higher in Oregon than in the preceding year.

1. *Areas of high barometer.*—The prevailing high barometer off the south Atlantic coast was especially marked on the 14th and 19th. The great southward flow of dry, cold air that took place on the 14th, 15th, 16th and 17th, reaching from British America to Florida and prevailing over the entire country east of the Mississippi until the 18th, was the most remarkable feature of the month.

I. Passed eastward on the 2d over the Southwest, and on the 3d over the Ohio valley to the Atlantic coast.

II. Passed from the Southwest on the 4th eastward to the south Atlantic coast on the 5th.

III. Passed from Texas on the 10th eastward to the south Atlantic coast on the 11th.

IV. Extended on the 11th from Dakota to Texas; continued on the 12th in the lower Mississippi valley, and moved eastward on the 13th over Kentucky and Virginia, with clear, cold weather from Tennessee to Michigan and Maine. On the 14th it remained off the middle and east Atlantic coasts.

V. The slight depression following the preceding area was immediately succeeded on the 14th by one of the most extensive regions of dry, cold air and high pressure. Its southward advance over Lake Superior began on the night of the 13th-14th. The highest pressures were: on the morning of the 14th over Lake Superior, 30.20; on the morning of the 15th, Lake Superior, 30.56; on the morning of the 16th, Lake Superior, 30.67; on the morning of the 17th, Michigan and Ohio, 30.40; on the morning of the 18th, northern New England, 30.33. The low temperature, prevailing during these days throughout the northern and eastern portion of the country, contributed materially to reduce the average temperature of the month. The average pressure off the south Atlantic coast seems to have received a decided increase during the week following the passage of this area of high pressure.

VI. This, also, flowed southward over the Lake region on the 25th and 26th, and the St. Lawrence valley on the 27th, being off the New England coast on the 28th, whence it apparently flowed southward to Cape Hatteras.

VII. Appears to have extended from Texas to Minnesota on the 29th, whence it moved eastward, was central on the Lower Lakes on the 30th, and disappeared in the St. Lawrence valley on the 31st.

2. *Areas of low barometer.*—Eleven areas of low barometer are traced on the accompanying Map No. I, of which four are well-marked, severe storms. With one exception, these have probably originated north of the Platte river, under the influence of the increasing temperature in the interior of British America. Their paths have, west of the 92d meridian, been almost entirely confined between the parallels of 42 and 45 degrees, and the majority of them have crossed the 72d meridian, between the parallels of 45 and 47 degrees. Their paths, therefore, have differed greatly from those of the storms of May, 1871 and 1873, but agreed more nearly with those of May, 1872 and 1874, excepting only that they lie three degrees to the southward of those of the latter month. Severe hurricanes occurred on the Atlantic to the eastward of our stations on several dates, but the marine reports do not suffice to show the positions and paths of the storms.

I. This, which was the severest storm of the month, began in April in the Southwest, and was, on the morning of May 1st, central in southern Illinois, whence it passed northeastward over Lakes Erie, Ontario and the St. Lawrence valley. The rain area was quite evenly distributed on all sides, and heavy snows occurred in its rear over the Upper Lakes.

Brisk and high winds from all directions prevailed in succession over the Ohio valley, Lakes, Middle and Eastern States. At midnight, May 1st, a small secondary depression had formed in the Middle Atlantic States, but whose further progress could not be traced. Local tornadoes were reported from Georgia, South Carolina, Tennessee, Indian Territory, the Lower Lakes, and destructive squalls on the Middle Atlantic coasts.

II. Area No. I was followed by an area of high barometer in the lower Mississippi valley, west of which appears to have formed during the 2d of May over Kansas low barometer No. II, which was but a slight depression, but can be somewhat hypothetically traced eastward and southward into the South Atlantic States, until it appears as a well-defined storm-centre on the morning of the 4th off the coast of North Carolina, followed in that region by brisk and high northeast winds.

III. Area No. III appears on the afternoon of the 4th, central in southern Dakota, and, after extending in a northeast direction, with rain and snow and local tornadoes on the Upper Lakes, may be considered to have turned southeastward into Missouri, while a branch area moved southeastward over the Lake region and central New York to the Middle Atlantic coast, where it developed during the sixth into a severe storm, and moved thence northeastward over southern New England, with a heavy rain during the 7th in eastern Massachusetts. A remarkable hailstorm occurred on the 6th off Cape Hatteras.

IV. During May 5th, the barometer continued to fall in Dakota, and, on the 6th, area No. IV was apparently central in that territory, with brisk and high southeast winds, warm, cloudy and rainy weather from Kansas and Illinois to Manitoba. The depression moved rapidly in a south-southeast direction during the 7th, and was, at midnight, probably central in Iowa, over which entire State prevailed the area of lowest pressure. During the 8th, this area moved more rapidly northeastward over Lake Superior, and thence apparently more nearly eastward toward the valley of the Saginaw.

V. While the preceding depression was moving over the Lake region, area No. V originated, on the 8th, in the Southwest, apparently in the region where the warm, southerly winds of the Gulf States were met by the cold, northerly winds following in the rear of storm No. IV, probably in the region of the Red river in Texas. It passed northeastward over Arkansas and Missouri, and, on the afternoon of the 9th, was central in Indiana, and severe storms and rains prevailed during that day in the Ohio valley. The storm-centre continued moving rapidly northeastward over western Pennsylvania and New York and down the St. Lawrence valley. Southwest gales, following this depression, prevailed on the 9th and 10th at Cape Hatteras. Local tornadoes were reported in Iowa, Illinois and Indiana on the 8th, and northern Ohio, Michigan and Lake Erie on the 9th.

VI. On the afternoon of the 10th, a disturbance was evidently central over northern Nebraska, and the severest westerly gale of the month was simultaneously reported from Cheyenne. Our reports do not allow us to decide whether this disturbance may not possibly have, during the preceding twenty-four hours, moved toward the region indicated from some point to the northwest or southwest thereof. The movement of the central low pressure was first southeast, thence directly eastward to a point just north of Chicago on the afternoon of May 11th, at which time heavy winds prevailed from Ohio to Kansas and northward to Lake Superior, and heavy rains in southern Wisconsin. Passing east-northeastward, the storm was central north of Montreal on the afternoon of the 12th, and was followed by brisk southwest to northwest winds over the Lake region and the Middle Atlantic States.

No. VII. The high barometer that followed the storm No. VI, and was central in Missouri on the morning of the 12th, was immediately followed on the afternoon of that day by the origin of a new storm-centre near the northern border of Nebraska. On the morning of the 13th, cold westerly winds prevailed at Cheyenne, and southeast winds, with rain, in the upper Mississippi valley. The lowest pressure being apparently central

near Yankton, subsequently moved east-southeastward into northern Illinois, and was central a little to the south of Grand Haven on the morning of the 14th. During that day, increasing winds and light rains prevailed over the Lake region, while the storm-centre moved eastward between Buffalo and Kingston, and was, on the morning of the 15th, central near Lake Champlain, whence it moved northeastward beyond our stations, and was followed by the remarkable area of cold air and high barometer No. V.

Nos. VIII and IX. On the 14th, an area of cold air, with dry, clear weather, began moving southward over the Lake region, and its influence prevailed over the entire country east of the Rocky Mountains until the 19th, during which interval southerly winds, occasionally increasing to gales, prevailed from Kansas to Manitoba, with cloudy weather, and, on the 17th and 18th, light rains. Northerly winds, gradually diminishing in force and shifting to southeast, prevailed east of the Mississippi. Local depressions appeared on the 19th, in New England, and a general fall of pressure occurred over the Lake region, probably in connection with a central low barometer, between Lake Huron and Hudson's Bay, on the morning of the 20th, which depression may be considered central in northern New England on the afternoon of the 20th, at which time, also, a slight depression existed in Iowa. The latter, which is marked as area No. IX, continued nearly stationary until the afternoon of the 21st, a tornado being reported in Indian Territory on the 20th, while the area of cloudy weather and light rain extended slowly to Arkansas, the Ohio valley and New York. The depression itself seems to have moved eastward into Michigan, where it disappeared at midnight, and a general area of cloud and rain extended eastward over the Middle and Eastern States.

No. X. From the 21st to the 24th, no well-marked depression is presented, except the continued formation and disappearance of slight depressions and numerous light rains. On that day areas of low barometer existed in the South Atlantic States and the Upper Lake region, but did not develop further. The steady diminution, of pressure in the extreme Northwest and probably in British America, seems to have exceeded its normal rate, and finally to have culminated in the formation, on the 26th, of an area of low barometer in Nebraska and Dakota, and increasing northerly winds continued, with light rains during the 27th, from Nebraska to Manitoba. The central lowest pressure moved from Iowa northeastward over Lake Superior on the 28th, and thence southeastward to Lake Ontario on the morning of the 29th, accompanied by very general rains over the Lake region. During the 29th colder, northerly winds and rain, followed by clear weather, prevailed over the Lower Lakes, while the storm-centre turned again northeastward down the St. Lawrence valley.

No. XI. May be approximately located in western Dakota in the afternoon of the 29th, and in western Minnesota on the afternoon of the 30th, but apparently oscillated about in this region until midnight of the 31st. It was near St. Paul on the morning of June 1st, and its subsequent history belongs to that month. During the nights of the 31st of May and 1st of June, unusually heavy rain-storms prevailed in western Iowa and southern Minnesota.

TEMPERATURE OF THE AIR.

The average temperature of the air is shown by the isotherms on Map No. II, and by the table in the lower left-hand corner, from which it will be seen that the general average for the whole country is about 0.5° below its normal value, the greatest depression being in the St. Lawrence valley, and the greatest excess in the Lower Lake region.

Frosts.—The frosts have during the month been especially destructive in Ohio and Illinois, and others are reported in Minnesota on the 17th; Connecticut, 18th; Delaware, 18th; Illinois 16th and 18th; Indiana, 17th; New Jersey, 18th; New York 18th and 31st; Virginia 19th and 31st.

PRECIPITATION.

The general distribution of rain-fall is shown by the isohyetal on Chart No. III, from which it will be seen that the rain-fall is, on a general average, about 0.6 inches below its normal value. The largest deficiencies occur in the Gulf and Middle Atlantic States, where the rain-fall is less than one-half its usual amount. A slight excess of rain, amounting to one-quarter of its average amount, is reported from the upper Mississippi valley, the Lake region and South Atlantic coast, and a still larger excess from the St. Lawrence valley.

Cloudy days.—The cloudiness during the month has been decidedly below the average. It has been greatest in New England, where the average is from 7 to 11 cloudy days during the month; an average of 7 days is reported from New York, the Lake region and Minnesota, whence, as we proceed southward, the amount of cloud diminishes to an average of 1 or 2 days in the Gulf and South Atlantic States.

Rainy days have been, as usual, far more numerous than cloudy days, the average number being 15 over the Lower Lakes, New York and New England; 17 in Kansas and Indian Territory; 10 on the South Atlantic coast and in Tennessee, Kentucky, Missouri and Illinois.

RELATIVE HUMIDITY.

The relative humidity averages 70 per cent. along the Atlantic coast stations; 50 per cent. at stations in the neighborhood of the Appalachian ranges; 60 per cent. from the Lower Lake region to Missouri, and between 55 and 65 per cent. northward of this region.

WINDS.

The prevailing wind has been southeast to southwest throughout the Gulf States and Atlantic coast stations. It has been southeast in Kansas, Iowa and Minnesota, and west in the Lower Lake region.

Total movement of the air.—The largest total movements of the air are—at Pike's Peak, 14,808; Cape Hatteras, 11,377; Sandy Hook, 9,945; Cheyenne, 9,780; Peck's Beach, 9,500; Long Branch, 9,466; Erie, 8,969; San Francisco, 8,785; Indianola, 8,699; Cape Henry, 8,510. The lowest at: Portland, Or., 3,042; Lynchburg, 3,122; Augusta, 3,261; Montgomery, 3,802; Wytheville, 3,809; Shreveport, 3,853; Vicksburg, 3,866; Nashville, 3,894; San Diego, 3,978.

VERIFICATIONS.

The detailed critical comparison of the published Probabilities with the weather of the succeeding 24 hours shows, on the average, for the whole country, that 91.4 per cent. of the predictions have been verified.

117 Cautionary Signals have been displayed at the 43 Signal Stations on the Lakes and Atlantic coasts, of which 65 were reported well justified by the succeeding high winds, while 48 were partially justified, and 4 were too late; 49 occasions were noted on which brisk winds were not signaled, in the most of which cases, however, the winds did not come from dangerous points of the compass.

NAVIGATION.

Ice.—Ice moved out of the harbor of Escanaba on the 4th. In the eastern portion of Lake Ontario ice continued to impede navigation until the 14th. Sabago Lake, in Maine, was opened to navigation on the 4th. The navigation of the larger Lakes was continued throughout the month. Lake Champlain was generally open on the 30th of April, being the latest date for 60 years—it had been closed for 104 days—the longest period, with one exception, during this century.

The extreme depth of water in the Mississippi and its tributaries is shown by the table on chart No. III, whence it appears that at all river stations the water was, in the last week of the month, from 3 to 30 feet lower than during the first week.

TEMPERATURE OF THE WATER.

The temperature of the water has varied between 29° and 40° at Eastport, Maine, but between the extremes, 74° and 87° at Key West, Florida, the change being quite gradual as we proceed southward along the Atlantic coast. The range of temperature has increased from 5° in Maine to 13° along the South and Middle Atlantic coasts, but to 18°, 20° and 30° in the rivers and lakes in the interior of the country. The details, for all stations, are given in the table on Chart No. II.

ATMOSPHERIC ELECTRICITY.

Thunder-storms.—Displays of thunder and lightning have been least frequent in the Middle Atlantic States, where they have occurred on the 7th, 12th, 15th, 16th, 19th and 23d, and in southern New England, where they have occurred on the 1st, 2d, 8th, 9th, 12th, 15th, 19th, 20th, 24th, 29th and 30th. They have been most frequent in the Eastern Gulf States, Tennessee and the Ohio valley, the upper Mississippi and lower Missouri valleys, where they have occurred on from 16 to 20 days during the month.

Auroras.—The auroras most extensively visible were those of the 4th, in Connecticut, Maine, New York, Michigan, Wisconsin, Minnesota; on the 22d, in Connecticut, Maine, New Hampshire, Vermont, Massachusetts, New York, Ohio, Michigan, Wisconsin and Minnesota. Less extensive displays, were reported from two or more stations, on the 2d, 3d, 5th, 7th, 9th, 10th, 11th, 12th, 13th, 15th, 16th, 18th, 23d, 24th, 26th, 27th, 29th, 30th and 31st.

OPTICAL PHENOMENA.

(1) *Solar Halos* were observed at some stations on every day of the month but the 23d. The following is a list of those observed in two or more different States: 1st, Maine, Massachusetts, New Hampshire, New York, Connecticut, Georgia and New Jersey; 2d, Iowa and Georgia; 3d, Illinois, Maine, Missouri, New York, North

Carolina, Ohio, Virginia, Wisconsin, Michigan, Georgia, Nebraska and Minnesota; 4th, Dakota, Iowa, Kansas, Missouri, Nebraska, New Hampshire, New York, Michigan and Minnesota; 5th, Alabama, Kansas, Nebraska, New Hampshire, New York, North Carolina, Ohio, Virginia, West Virginia and Louisiana; 6th, Iowa, Maine, New Hampshire, Ohio and Wisconsin; 7th, Iowa, Nebraska, New York, Ohio, Louisiana and Wisconsin; 8th, Virginia, Louisiana, Maine and Mississippi; 9th, Iowa and Wisconsin; 10th, Kansas, Virginia and Wisconsin; 11th, Canada, Indiana, Mississippi, New York, Ohio and Georgia; 12th, Alabama, Dakota, Delaware, Iowa, Massachusetts, Mississippi, Nebraska, New York, Wisconsin, New Jersey, Connecticut, Louisiana and Michigan; 13th, Indiana, Mississippi, Ohio, New Jersey, Connecticut, Michigan, Georgia and Florida; 14th, California, Illinois, Indiana, Iowa, Maine and Ohio; 15th, Iowa, Missouri, Tennessee and Wisconsin; 16th, Alabama, Illinois, Indiana, Tennessee, Wisconsin and Georgia; 17th, Iowa, Michigan, Missouri, New York, Ohio, Wisconsin and Louisiana; 18th, California, Iowa, Kansas, Maine, New Mexico and Ohio; 19th, Nebraska, Alabama, Colorado, Dakota, New York, Ohio, Wisconsin, Georgia, Maine and Illinois; 20th, California, Mississippi, New Hampshire and New York; 22d, New York and Maine; 24th, Maryland, Massachusetts, New York and New Jersey; 25th, Alabama and Illinois; 26th, Mississippi and New York; 27th, Indiana and Kentucky; 29th, Mississippi, Nevada, New Hampshire, Massachusetts and Louisiana; 30th, Canada, Iowa, New York, Ohio, Wisconsin, Louisiana and Michigan; 31st, Illinois, Indiana, Ohio, Virginia, Louisiana and Wisconsin.

(2) *Lunar Halos*.—The principal Lunar Halos were observed as follows: on the 8th, Colorado, Kentucky, Ohio, Tennessee, Virginia; 9th, Georgia, Maryland, Ohio, Pennsylvania, Virginia, Wisconsin, Massachusetts and Iowa; 10th, New Hampshire, Wisconsin and Florida; 11th, Massachusetts, New Jersey, New York, Texas, Connecticut, Wisconsin and Indian Territory; 12th, Alabama, Illinois, Iowa, Kansas, Louisiana, Mississippi, Wisconsin, Florida, Minnesota and Indian Territory; 13th, Georgia, Kentucky, Maryland, Massachusetts, New Jersey, New York, Ohio, Pennsylvania, Texas, Utah, Virginia, West Virginia, Louisiana, Colorado and Indian Territory; 14th, Iowa, New York, Texas, Massachusetts, North Carolina, Florida and Indian Territory; 15th, Kentucky, Louisiana, Mississippi, Tennessee, Virginia, Texas, Illinois, and Florida; 16th, Kansas, Maine, Massachusetts, North Carolina, Texas, Florida and Georgia; 17th, Alabama, Iowa, Michigan, Minnesota, New York, Ohio, South Carolina, Colorado, Kansas and Indian Territory; 18th, Nebraska, Texas, South Carolina, Georgia, Utah, Iowa, Tennessee and Indian Territory; 19th, Canada, Ohio, Virginia, Massachusetts, Michigan and Georgia; 20th, Indiana, Maine, Massachusetts, New York, Utah, and Florida; 21st, Utah and Georgia.

(3) *Mirage*.—The phenomena of Mirage was observed on the 9th at Alpena; 10th in Iowa and Kansas; 14th in Kansas; 17th, Milwaukee; 25th, Kansas.

MISCELLANEOUS PHENOMENA.

(1) *Natural History*.—The following items relating to natural history have been reported—

Grasshoppers were reported in Kansas throughout the month, and in Nebraska thick during the latter part of the month, especially from the 22d to the 26th, during which time they were moving north and north-westward. They were especially reported on the 23d at Cheyenne and on the 21st at Denver.

Locusts.—Kansas, 8th to 12th and 25th.

The Colorado Potato Bug was reported from Delaware, Indiana, New Jersey, West Virginia and Ohio.

The first appearance of—Frogs, Vermont and Massachusetts, 7th; Duluth, 20th. *Cat Birds*,—Nebraska, 4th. *Yellow Birds*, New York, 23d. *Cuckoo*, New York, 28th. *Blue Birds*, Ohio, 3d. *Bobolinks*, Kansas, Massachusetts and New York, 10th; Vermont, 24th. *Doves*, Colorado, 12th. *Night Hawks*, Connecticut, 20th. *Swallows*, Connecticut 1st; Utah, 6th; Wisconsin, 7th; Vermont and New Hampshire, 9th; Minnesota and New York, 11th; Nebraska, 15th; North Carolina, 17th. *Thrushes*, Kansas, 3d; New York, 11th. *Orioles*, Michigan, 4th; New York, 9th; Ohio, 8th. *Blackbirds*, Utah, 1st. *Robins*, Utah, 1st. *Whippoorwills*, Nebraska and Iowa, 6th; Kansas, 7th; Wisconsin, 8th; New York, 11th; Michigan, 16th; Indiana, 19th. *Martins*, Vermont, 1st. *Eagles*, Pike's Peak, 14th. *Bluefish*, Squan Beach, 18th.

Migration of Birds, &c.—Gulls.—Hudson, Michigan, 9th, flying west. *Eagles*.—Corsicana, Texas, 20th, flying southeast. *Pigeons*.—La Crosse, Wisconsin, 14th and 15th, flying east. *Geese*.—Grand Haven, Michigan, 3d, flying north; Atlantic City, New Jersey, 6th, flying north; Nashville, Tennessee, 7th, flying north. *Ducks*.—Atlantic City, New Jersey, 6th, flying north.

(2) *Forest Fires*.—Important forest fires were reported during the month from New Hampshire, Pennsylvania, Massachusetts, New Jersey, New York, Virginia, West Virginia, Michigan, Wisconsin and Nebraska.

(3) *Polar Bands*.—These were observed on the 3d in Virginia; 5th, Virginia and West Virginia; 11th, Virginia; 13th, Virginia; 14th, Iowa; 15th, Iowa; 16th, Ohio and Wisconsin; 18th, Michigan and Ohio; 19th, Virginia; 20th, South Carolina; 31st, Virginia and South Carolina.

(4) *Meteors*.—Bright meteors were reported on the 2d at Newfoundland and Maryland; 4th, Texas; 6th, Maryland; 9th, Newfoundland; 13th, Massachusetts; 17th, Ohio; 23d, New York; 26th, Indiana; 27th, Indiana; 28th, Indiana; 31st, Maryland.

(5) *Zodiacal Light* was observed at Galesburg, Illinois, on the 15th, 29th, 30th and 31st.

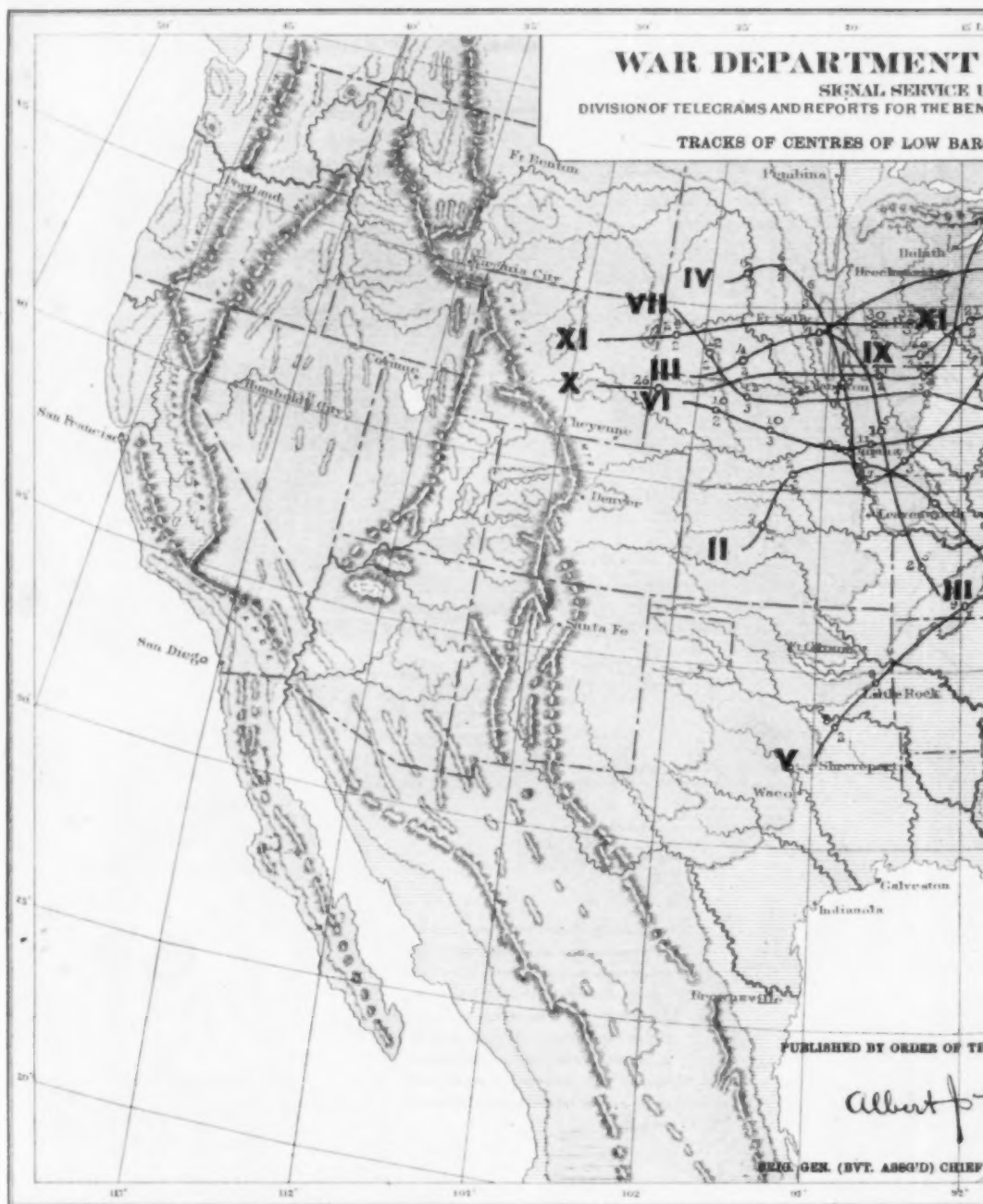
(6) *Earthquakes*.—Slight shocks or rumbles were reported from El Monte, California, on the 15th, 30th and 31st. Milton, Massachusetts, 15th.

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Albert J. Myers

Brig. Gen. (Bvt. Assg^t.) Chief Signal Officer, U. S. A.

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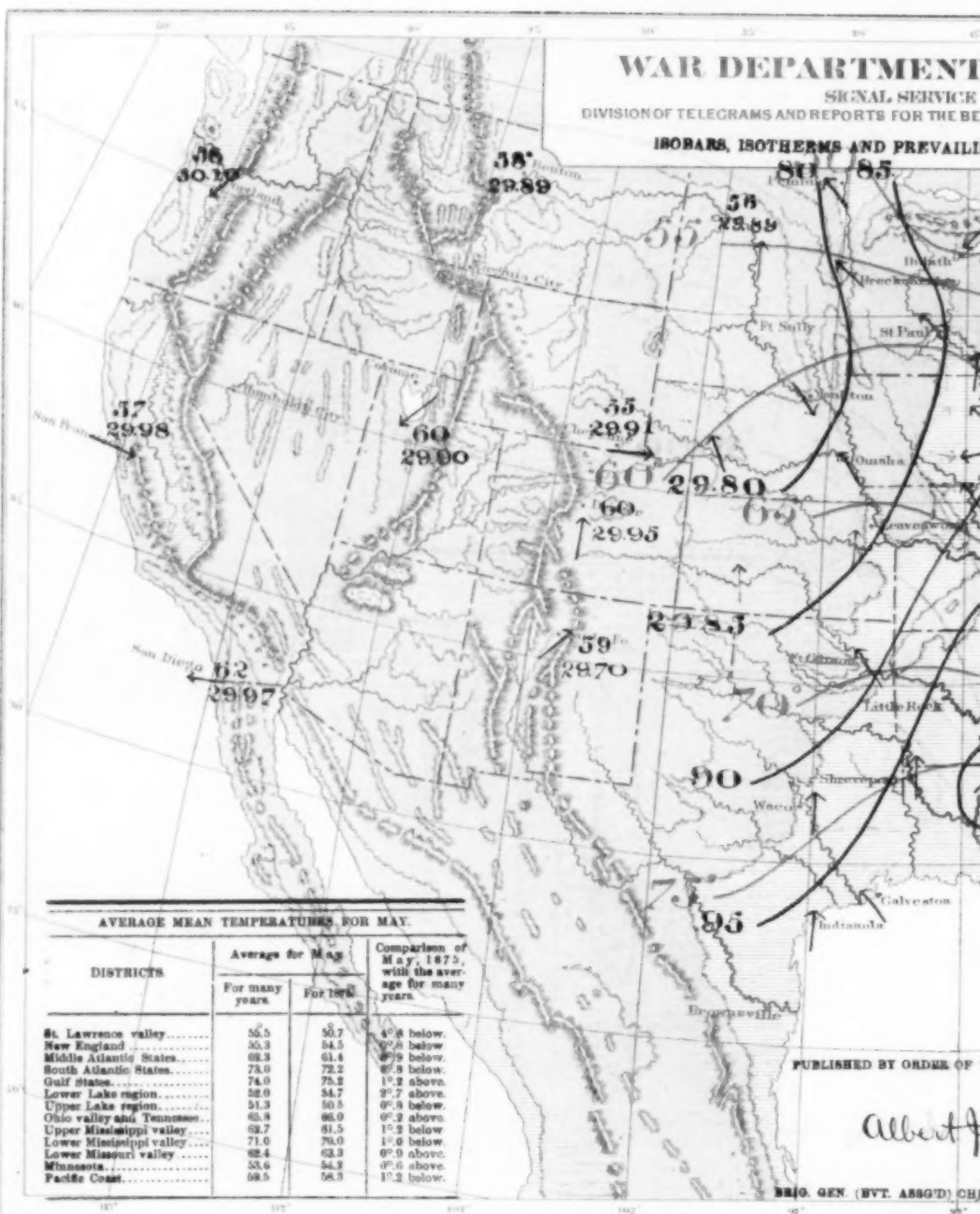


No. I.



SIGNAL SERVICE

ISOBARS, ISOTHERMS AND PREVAILING



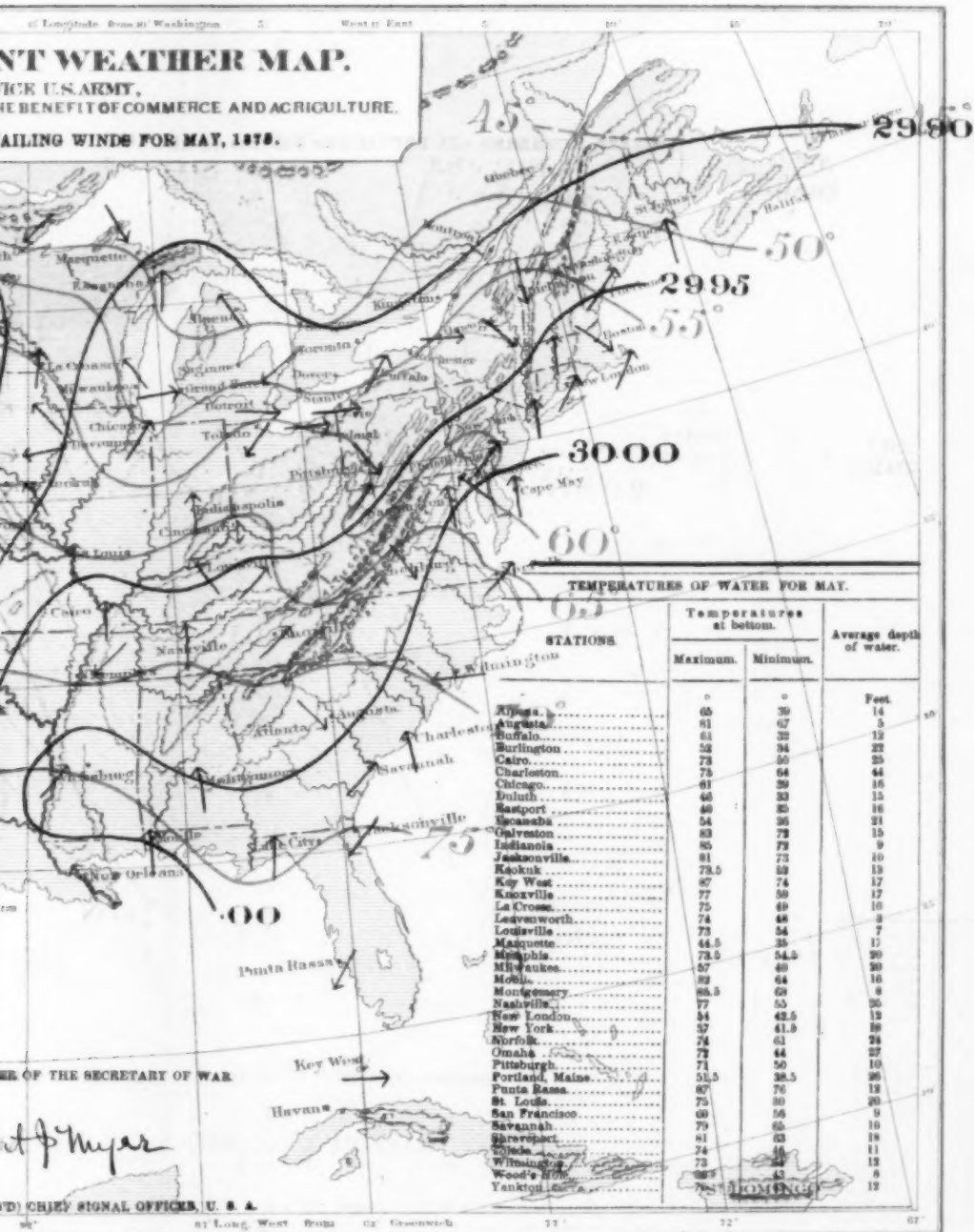
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BRIG. GEN. (HVT. ASSG'D) CH)

NT WEATHER MAP.

FOR U.S. ARMY,
THE BENEFIT OF COMMERCE AND AGRICULTURE.

AILING WINDS FOR MAY, 1878.



OFFICE OF THE SECRETARY OF WAR

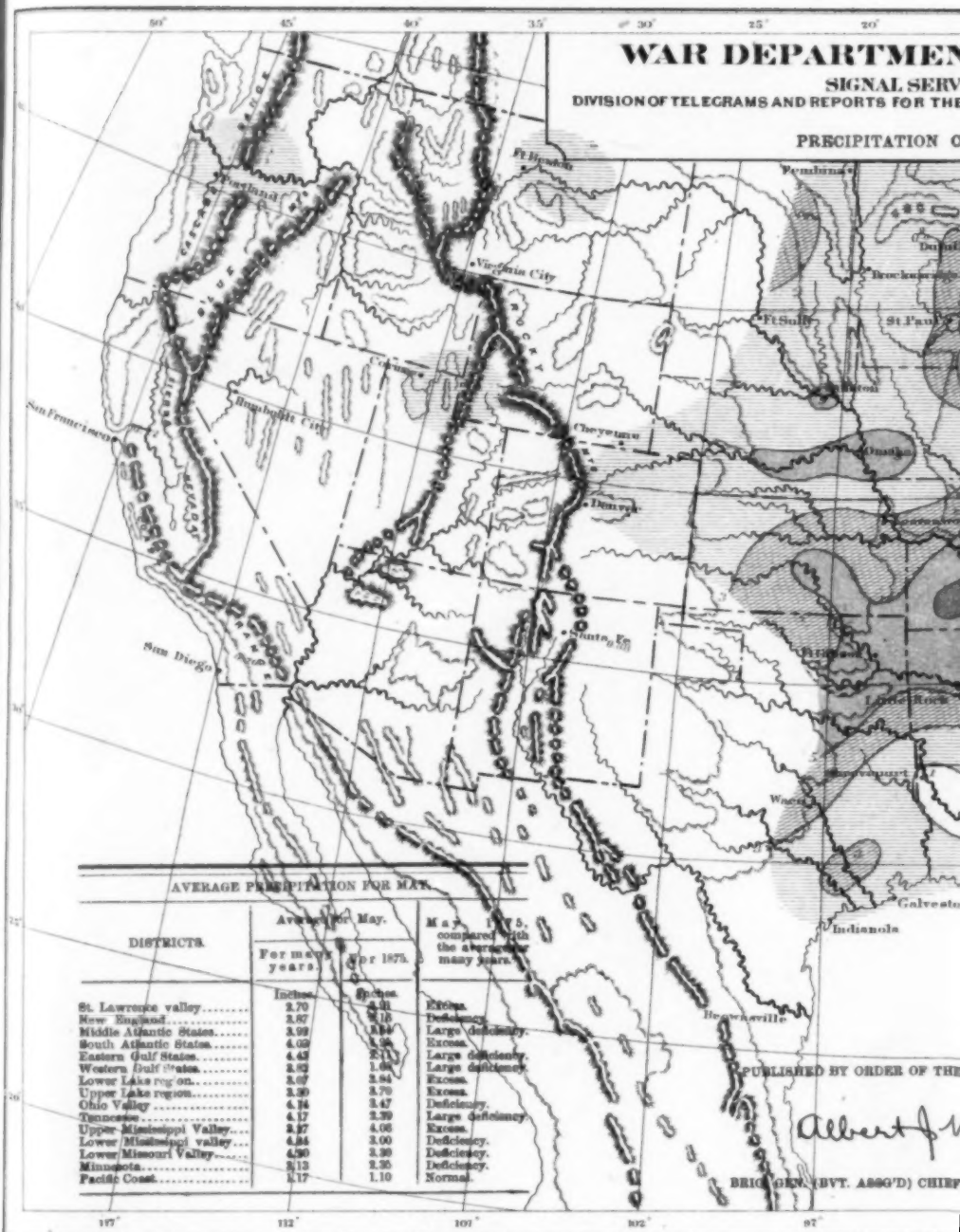
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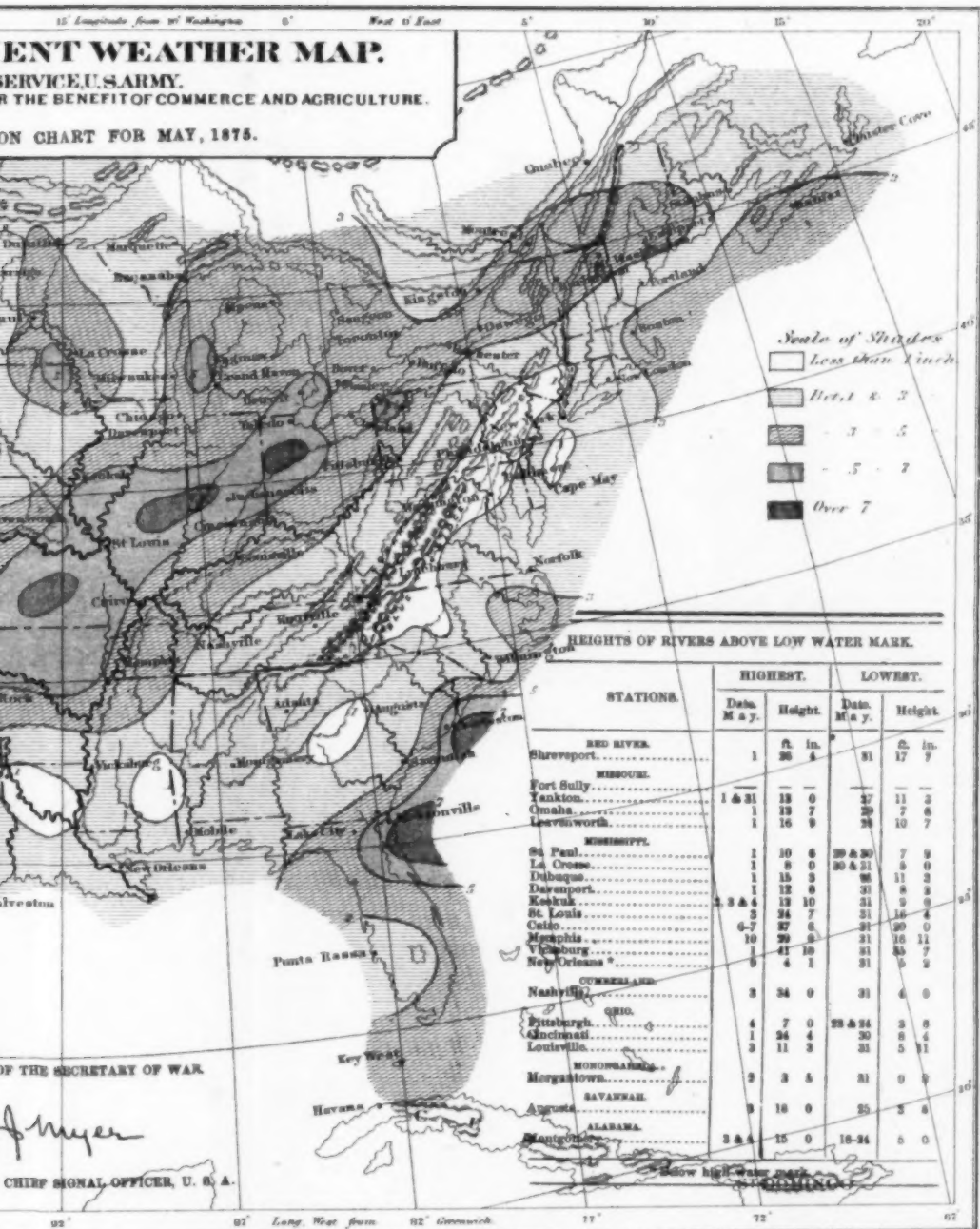
(D) CHIEF SIGNAL OFFICER, U. S. A.

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

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OF THE SECRETARY OF WAR.
J. Meyer
 CHIEF SIGNAL OFFICER, U. S. A.